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09/630,680	08/01/2000	Shinichi Imai	819-405	7497

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18
EXAMINER

AHMED, SHAMIM

ART UNIT PAPER NUMBER

1765

DATE MAILED: 08/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n No.

09/630,680

Applicant(s)

IMAI, SHINICHI

Examiner

Shamim Ahmed

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,4,6,9,10,12 and 19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 19 is/are allowed.
- 6) ☒ Claim(s) 1,3,4,6,10 and 12 is/are rejected.
- 7) ☒ Claim(s) 9 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1,3-4,6-7,9-10 and 12 have been considered but are moot in view of the new ground(s) of rejection.

Applicants argue that Inazawa et al does not teach the etching selection ratio of the silicon dioxide/resist is increased.

In response, examiner states that applicant's argument is more specific than the claims because the selection ratio between the silicon oxide/resist is not claimed.

Applicants also argue that examiner should provide evidence to support the official notice taken on the previous office action.

In response, examiner states that the argument is moot upon canceling the claim 7 and furthermore, the limitation of the canceled claim is incorporated in the newly added claim 19, which is now allowed .

Claim Objections

2. Claim 9 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 9 is now depends on a cancel-based claim 13.

Remarks

The newly added claim 13 is renumbered as claim 19 according to the Rule 126.

Claim Rejections - 35 USC § 103

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3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1,3-4, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inazawa et al (5,595,627) in view of Zhu et al (6,297,163).

Inazawa et al disclose a plasma etching process, wherein a silicon dioxide layer is etched over a substrate in which a resist pattern is also been formed and the etching is performed using a fluorocarbon gas such as C_4F_8 (col.2, lines 16-20 and col.6, lines 8-23).

Inazawa et al fail to teach the introduction of a fluorocarbon gas contains at least one of C_4F_6 , C_5F_8 and C_6F_6 gases.

However, Zhu et al teach an etching process, wherein silicon dioxide is etched using fluorocarbon gases such as C_5F_8 , CF_4 , C_4F_8 , etc. (col.5, lines 9-12 and col.6, lines 66-col.7, line1).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Zhu et al's teaching into Inazawa et al's process because both the C_5F_8 and C_4F_8 gases are functionally equivalent and would perform the same as the claimed invention as taught by Zhu et al.

Inazawa et al also disclose that residence time of the processing gas is determined and Controlled in a predetermined range.

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Further more, Inazawa et al teach that the value of the residence time dependence on the basis of the target value of the etching ratio (col.7, lines 18-25 and col.8, lines 14-24).

Inazawa et al fail to teach the exact value of the residence time.

However, it would have been obvious to one skill in the art at the time of claimed invention to optimize the specific time for the etching in order to maintain a proper etching section ratio, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

As to claim 4, Inazawa et al teach that pressure of the processing chamber, flow rate of the fluorocarbon gas and the voltage is controlled by a controller section (col.8, lines 36-42).

Inazawa et al remain silent about controlling $P \times w_0 / Q$ at $0.8 \times 10^4 \text{ sec. W/m}^3$ or less than $8 \times 10^4 \text{ sec. W/m}^3$.

It would have been obvious to one skill in the art at the time of claimed invention to optimize the same for effective etching ratio, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

5. Claims 10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al (5,244,730) in view of Mountsier et al (6,184,572).

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Nguyen et al disclose a plasma process, wherein an organic film is deposited on a substrate by introducing a fluorocarbon gas of C_4F_8 (col.3, lines 37-49).

As to claim 10, Nguyen et al fail to disclose the fluorocarbon gas could be at least one of C_4F_6 , C_5F_8 and C_6F_6 gases.

However, Mountsier et al teach that hexafluorobenzene (C_6F_6) is a beneficial fluorocarbon gas over a commonly used fluorocarbon gas such as C_4F_8 to deposit organic film.

Mountsier et al also disclose that the resulting film has better capability to withstand in high temperature (col.3, lines 6-23).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Mountsier et al's teaching into Nguyen et al's process in order to deposit an organic film, which exhibit greater thermal stability as taught by Mountsier et al.

Nguyen et al disclose that power density of the process is typically maintain at the range of 0.05 to about 0.4 W per cm^2 along with the residence time (col.4, lines 49-59).

Nguyen et al also disclose that pressure, flow rate and the residence time of the fluorocarbon gas is maintained at about 0.9 seconds (col.3 lines 37-49 and col.4, lines 14-17), wherein the residence time is generally expressed by a simple equation:
residence time = capacity of the processing chamber x pressure / supply rate of the processing gas, which is supported by Inazawa et al (col.7, lines 17-22 of the patent 5,595,627).

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Nguyen et al remain silent about controlling $P \times w_0 / Q$ at $0.8 \times 10^4 \text{ sec.W/m}^3$.

However, it would have been obvious to one skill in the art at the time of claimed invention to optimize the same for efficient controlling the deposition rate, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Boesch*, 617 F.2d 272,, 205 USPQ 215 (CCPA 1980).

As to claim 12, Nguyen et al teach that a pump controls the pressure of the chamber and also the flow rate of the gas is controlled by a valve (col.4, lines 31-36 and lines 45-48).

Allowable Subject Matter

6. Claim 19 is allowable over prior art.

7. The following is a statement of reasons for the indication of allowable subject matter: The prior art does not teach an etching/deposition process, wherein residence time of the first and the second fluorocarbon gas for the first and the second plasma, respectively is controlled at two different value as the context of claim 19.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

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TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (703) 305-1929. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G Norton can be reached on (703) 305-2667. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Shamim Ahmed
Examiner
Art Unit 1765

SA

NADINE G. NORTON
PRIMARY EXAMINER

